Center Innovation Fund: MSFC CIF

Development of Floating Slosh Dampers for Propellant Tanks - FY17

Completed Technology Project (2016 - 2017)

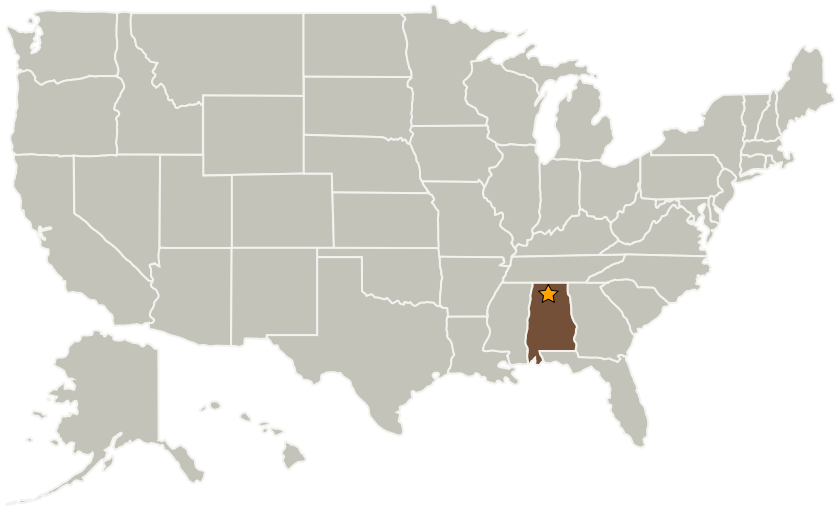
Project Introduction

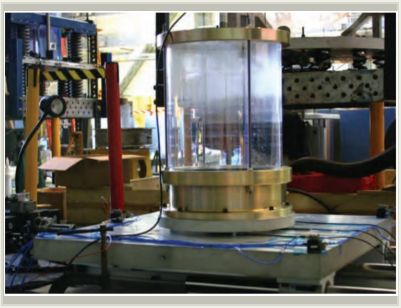
The proposed novel method of slosh damping may both reduce the cost of the design and manufacture of propellant tanks, but also increase the performance of the launch vehicle through reduced weight and improved vehicle control. The objective of this proposal is to develop, test, and analyze the innovative concept of a floating slosh damper consisting of hollow spheres. Investigate the effects of sphere diameter, material, and number of layers for effectiveness of slosh control.

Anticipated Benefits

There is a need for propellant tank slosh dampers that have lower weight, reduced complexity, and reduced development effort. The purpose of the proposed work is to investigate the effectiveness and performance advantages of floating slosh dampers for achieving these goals. The standard method for damping fuel slosh in propellant tanks is a set of baffles. However, these add significant weight, design and analysis work, and manufacturing complexity to a propellant tank. For example, the weight of the Space Launch System Core Stage Liquid Oxygen (LOX) tank baffling is estimated at over 2000 lbs. and involves 6000 parts. This equates to about 3.4 lbs. of baffles per square foot of fluid surface area.

Primary U.S. Work Locations and Key Partners





The test setup used for some of the data collection. The tank is mounted to a plate instrumented with three accelerometers. The plate rides on three rails allowing accelerations to be applied to the tank.

Table of Contents

Project Introduction	1
Anticipated Benefits	1
Primary U.S. Work Locations and Key Partners	1
Images	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	2
Technology Areas	3
Target Destinations	3

Center Innovation Fund: MSFC CIF

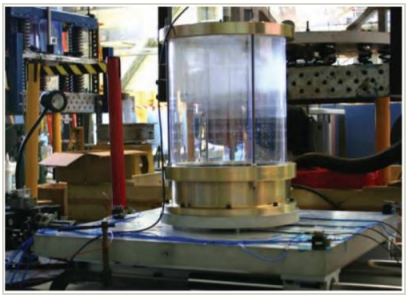
Development of Floating Slosh Dampers for Propellant Tanks - FY17

Completed Technology Project (2016 - 2017)

Organizations Performing Work	Role	Type	Location
★Marshall Space Flight Center(MSFC)	Lead Organization	NASA Center	Huntsville, Alabama

Primary U.S. Work Locations
Alabama

Images



Project Image
The test setup used for some of the data collection. The tank is mounted to a plate instrumented with three accelerometers. The plate rides on three rails allowing accelerations to be applied to the tank.
(https://techport.nasa.gov/image/35790)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Center / Facility:
Marshall Space Flight Center (MSFC)

Responsible Program:
Center Innovation Fund: MSFC CIF

Project Management

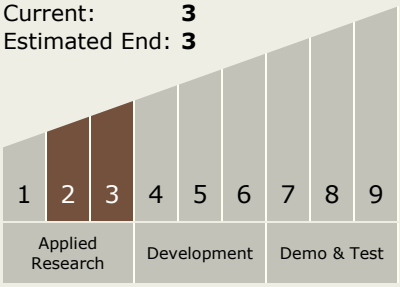
Program Director:
Michael R Lapointe

Program Manager:
John W Dankanich

Principal Investigator:
James P Downey

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



Development of Floating Slosh Dampers for Propellant Tanks - FY17

Completed Technology Project (2016 - 2017)

Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.1 Chemical Space Propulsion
    - TX01.1.1 Integrated Systems and Ancillary Technologies

Target Destinations

Earth, The Moon, Mars